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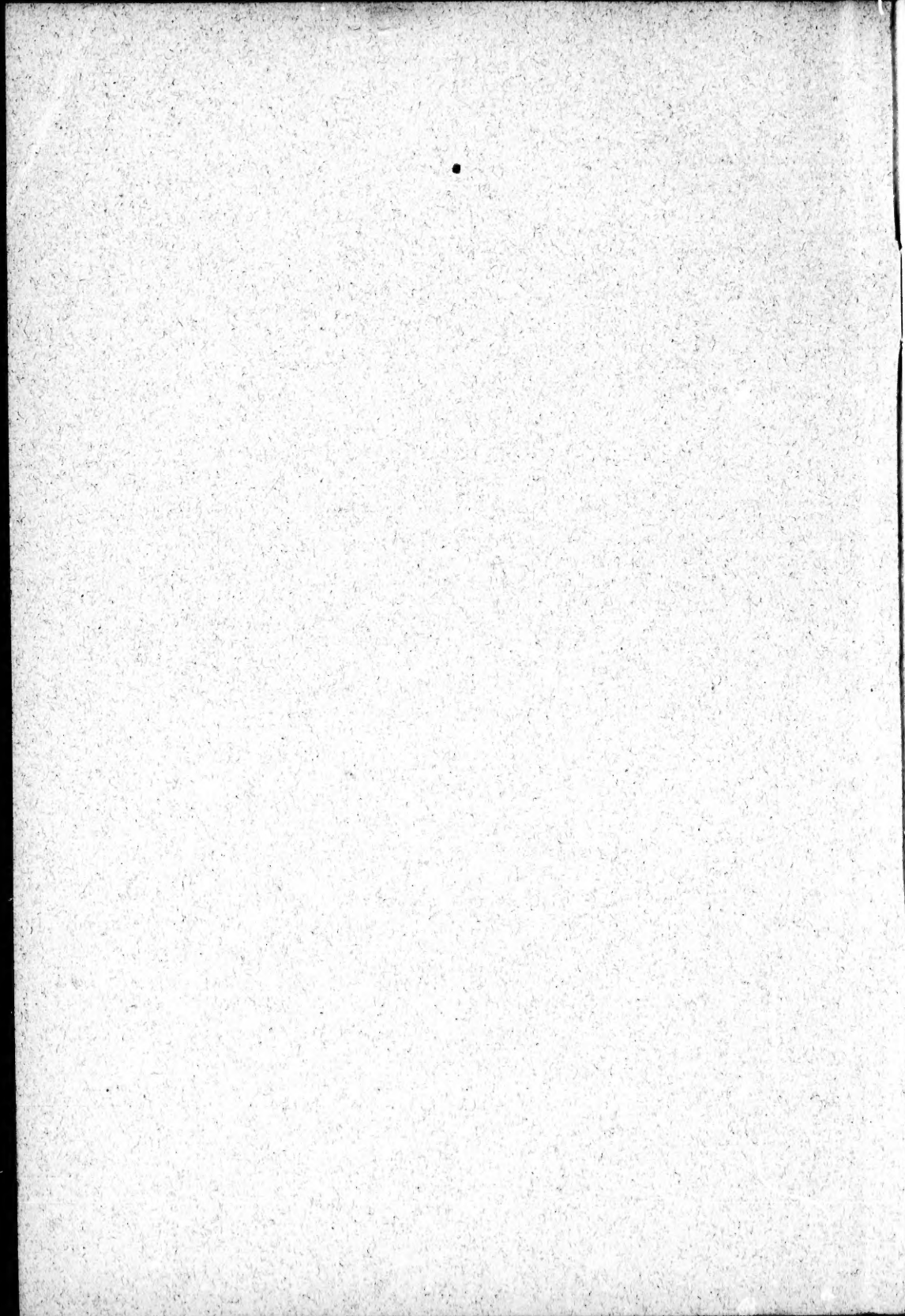
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From "THE PRACTITIONER" for August, 1897.

ON THE SURGERY OF BRONCHOCELE.

By FRANCIS J. SHEPHERD, M.D., C.M.,

*Professor of Anatomy, and Lecturer on Operative Surgery, McGill University ;
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It is only twenty years since any scientific method for removal of the whole or a portion of the thyroid gland has been introduced. In reality, it was not until the universal adoption of antiseptic surgery that any success was obtained. Formerly, from time to time, single cases of removal of the thyroid were reported, and these were quite as often fatal as successful. It is true that only the larger thyroids, at this time, were treated surgically, for it was only when the bronchocele became dangerous, interfering with respiration and deglutition, that surgical advice was sought and surgical interference recommended. In the cystic form, reliance was placed on tapping and injection with iodine, or the use of setons. In the solid forms potassium iodide internally, in large doses, and the use of the biniodide of mercury ointment externally, were employed. Tapping and injection with iodine were strongly advocated, and frequently practised with success, by the late Sir Morell Mackenzie (*Lancet*, May, 1872); but the danger of acute sepsis was so great that this mode of treatment was never popular with surgeons. Excision of the cysts was recommended by Celsus, Galen, and many others, and was revived as a new treatment from time to time. Incision was practised from time immemorial. Professor W. Warren Green, of Portland, Maine, in the later 'sixties, performed successfully several extirpations of very large thyroids, one of which was excessively vascular (*Am. Jour. Med. Sc.*, January, 1871). His method was to make an

* A lecture delivered before the Post-Graduate Class of McGill University, June 7th, 1897.

incision directly over the tumour, down to the fascia propria of the gland; the thin fascia propria was then carefully divided on a director, the prominent veins being avoided, and then the tumour, regardless of even very great hæmorrhage, was rapidly enucleated, and the posterior part, or pedicle where the arteries entered, ligated in sections, and the tumour removed. In one case of huge tumour, the operation was completed in twenty-two minutes. As was the custom in those days, the ligatures were left long and brought out at the lower end of the wound, and came away in about three weeks. In the three cases reported recovery took place, the wound healing rapidly by first intention at every point, except where the ligatures had been. At the conclusion of his admirable paper, Professor Green says: "I prefer to submit these cases to the profession with very little comment. They are the only ones in which I have ever performed the excision of bronchocele, and if they are the last I shall not regret it. For, while their issue has been so fortunate, I am sure that no man could witness even, much less perform, those operations and envy the man upon whose lot it fell to undertake them. Yet, under similar circumstances, I should not shrink from such responsibility, and this for the reason that the possibility of successful extirpation, even of the worst cases, is established; and I believe the operation, performed in the manner I have indicated, may claim quite as secure a place among legitimate *derniers ressorts* as amputation at the hip-joint."

This explains well the position of surgeons of that day; they regarded operation on the thyroid as a *dernier ressort*, and undertaken only to save life, never for the relief of deformity or discomfort. The late Professor Geo. E. Fenwick, of Montreal, stimulated by Professor Green's example, successfully removed an enormous cystic bronchocele in 1872 (*Can. Med. and Surg. Jour.*, vol. i., 1873).

According to P. Bruns, in a paper read before the German Surgical Congress of 1896, previous to 1877 only 150 cases of extirpation of the thyroid had been recorded, with a mortality of 21 per cent. During the five years following 1877, 240 operations were reported, with a death-

rate of 12 per cent. The lessened mortality and greater number of operations were chiefly due to the introduction of a better technique, more certain methods of arresting bleeding, and the general adoption of the Listerian principles of antiseptic surgery; for the former prevent deaths from secondary hæmorrhage, and the latter from wound infection. Rose, at the German Surgical Congress of 1877, gave his experience of the radical cure of goitre by extirpation; and, within a year or two, Billroth, Kocher, Socin, the two Reverdins, and others, improved the methods of operation and still further reduced the mortality. But everything was not so bright as it seemed; there was a dark side to the picture. The Messrs. Reverdin (*Revue Méd. de la Suisse Romande*, 1883) followed the after course of their patients for several years, and found that in a certain proportion (about 20 per cent., if I remember aright) curious conditions existed, something like myxœdema. There was first weakness and coldness at the limbs, then loss of appetite, slowness of speech, diminution of memory, and progressive anæmia, accompanied in some cases by a peculiar œdema most marked in the face. It was found that these symptoms occurred only when the thyroid was totally extirpated. The Messrs. Reverdin attributed this condition to a lesion of the vaso-motor nerves. In cases of total extirpation, when the patient remained healthy, the escape from the cachexia was probably due to the presence of supernumerary or parathyroids. This report of the Reverdins did not attract the attention it deserved, and it was not until the following year, at the Twelfth German Surgical Congress, when Kocher read his communication on Cachexia Strumipriva, that surgeons became alive to the importance of the symptoms produced by total extirpation of the gland. Kocher has since then given the disease produced by total extirpation of the thyroid the name of "cachexia thyreopriva." To prevent the occurrence of this disease many devices were advocated, such as introducing sheep's thyroid into the peritoneal cavity, or under the pectoral muscles, etc.; but it was not until the importance of the internal administration of animal extracts was discovered that extract of thyroid was given for this disease and

myxœdema. Dr. Chas. Murray, of Newcastle, England, was the first to use it for goitre. Now, however, total extirpation of the thyroid is rarely attempted except in malignant growths, and cachexia thyreopriva is seldom seen. About 1880 Prof. Woelfler introduced the method of ligature of the four thyroid arteries for the cure of thyroid tumours, and his method was followed with more or less success by other surgeons. Now it is only practised in cases of exophthalmic goitre or very vascular goitres. Socin before this recommended enucleation of only the diseased portion of the gland, practised it with great success, and reported fifty cases. It had been previously adopted in 1840 by the Italian surgeon Porta, and then by Juillard, Rothman, and others. This operation, which I shall describe fully later on, consists in intra-glandular shelling out of the degenerated portions of the gland. The great advantages of this operation are the lessened danger of hæmorrhage and injury to the recurrent laryngeal nerve, also the absence of any fear of producing cachexia strumipriva. Yet another method of treating bronchoceles has been advocated by Mr. Sidney Jones (*Lancet*, November 28th, 1883)—namely, excision of the isthmus. In the case reported there was a great deal of dyspnœa, which was relieved by the operation, and a month after, the large thyroid itself was scarcely perceptible. The late Sir G. D. Gibb, formerly of Montreal, many years ago advocated division of the isthmus to relieve the severe dyspnœa which occurs in large bronchoceles. Leon quite recently has treated large bronchoceles successfully merely by open incision of the skin and exposing the gland to the air for some time, and then closing the wound. Perhaps one of the most epoch-making papers was that read by Kocher, of Berne, at the German Surgical Congress of 1895. He reported 1,000 operations for goitre. In his last 900 cases there was only one case of cachexia strumipriva; in this case one half of the gland was removed and the other half atrophied. In 7 per cent. the recurrent nerve was injured and the voice impaired. Of the 870 cases operated on for non-malignant disease, only eleven died. Five desperate cases died as the immediate result of the operation, and three died of Graves's

disease. Now Kocher, in cases of Graves's or Basedow's disease, ligates three arteries; in one case, where four were ligated, tetany developed. There was one death from chloroform in the first 100, and none in the next 900. He advises cocaine anæsthesia if there be much dyspnœa. The surgical treatment of Graves's disease by excision of the thyroid, partial or complete, has been practised considerably of late, and many cases of cure have resulted. In some cases where the whole gland has been removed myxœdema has resulted, but has been cured by the administration of sheep's thyroid. In some cases sudden death has occurred after operation on the thyroid in Graves's disease.

Bronchoceles are of very many varieties. First, and most common, are the cystic. The cysts may either contain fluid or colloid material. The fluid may be all colours, from a straw yellow to a dark brown—the latter colour probably caused by blood extravasation, and containing cholesterolin crystals. The colloid cysts are almost colourless. These solid, or semi-solid, thyroid tumours have a distinct fibrous capsule, and are composed of vesicles filled with colloid matter and lined with cubical epithelium. The cyst wall is made up of several layers with atrophied gland tissue between; there is the evidence of the coming together of vesicles by atrophy of the intervening wall.

Many of the fluid cysts have solid matter in masses at the base; not infrequently the cysts are multiple; the most favourable cases for operation are those in which we have unilateral cysts.

Secondly, diffuse bronchocele. Where the enlargement of the gland is diffuse no special growth can be made out, but the gland is evenly enlarged. Such cases are also due to an excess of colloid matter in the vesicles, and are not so favourable for operation as the cystic. It is customary in these cases, first, to treat the patient by the administration of thyroid extract gr. v thrice daily, and the good results are often very surprising. I have now a patient under treatment with a very large diffuse thyroid, where the neck has diminished five inches in size the last three months. In some cases the gland has diminished so much by this treatment

that it has become functionless. If the administration of thyroid extract exercises no beneficial effect, then, if operation be decided upon, only one half the gland should be removed. After operation the other half frequently atrophies.

Thirdly, the vascular bronchoceles. These occur chiefly in cases of Graves's disease, and are very formidable to treat by excision.

The treatment of Graves's disease by operation has not been very popular owing to the great danger of death from causes unknown. A very high temperature often follows thyroid excision, owing, it is thought, to excessive thyroid absorption. Jaboulay (*Lyon Médical*, February 7th, 1897) argues that since the prominent symptoms of exophthalmic goitre are those of permanent excitation of the cervical sympathetic, resection of that nerve trunk is the most valuable method of treatment. He reports a second series of three cases to support his contention. In these cases the eyes retracted, the thyroid diminished in size, and the tumour and tachycardia were immediately relieved. The operation is an easy one, and the relief is immediate and lasting. I have only operated in two cases of exophthalmic goitre, and in both there was evidence of encysted solid growths. In both cases there were marked tremor, tachycardia, and in one exophthalmos, and in the other œdema of the lower extremities. The removal of the excess of thyroid immediately relieved the patients, and their recovery was complete. In many of the cases I have operated on there were nervous symptoms, such as tachycardia, being easily startled, and symptoms of hysteria, which were all relieved by operation. It is my opinion that there are degrees of Graves's disease as of myxœdema; the thyroid being in evidence in the first class they are not overlooked, though often the enlarged thyroid is not given the credit for producing the nervous symptoms. In the second class I believe many cases of incipient or mild myxœdema are overlooked. In these cases there is drowsiness and less mental acuteness than formerly, and relief is afforded by the administration of thyroid extract.

Fourthly, malignant tumours. These may be either cancerous or sarcomatous. Operation is difficult, and of

only temporary benefit. When there is much surrounding infiltration they should be left alone.

Fifthly, inflamed goitres. When a goitre is acutely inflamed, Kocher advises extirpation. Incision and drainage is the best treatment where pus is suspected.

Other forms of tumours, such as those produced by benign growths, echinococcus, etc., are occasionally seen, and require but little notice.

THE DANGERS OF OPERATION.

The great dangers of operation on the thyroid are hæmorrhage, wounding or injury of the recurrent laryngeal nerve, and the after-effects from total extirpation of the gland.

Formerly it was thought necessary by some to perform tracheotomy before extirpating the thyroid, but it is now found that this is an unnecessary procedure, that it complicates the operation and renders the risk of sepsis greater. After removal of the goitre the dyspnœa immediately disappears, and the supposed danger from after-collapse of the trachea is found to be chimerical. There is no doubt but that in these cases the suffocation can be best relieved not by tracheotomy, but by removal of the bronchocele. After a short demonstration of the surgical anatomy of the thyroid, the lecturer described the various operations as follows :

OPERATION.

There are three main methods of operating on the thyroid :—

1. Extirpation, partial or complete.
2. Enucleation.
3. Ligature of the thyroid arteries.

Of the last method I have had no experience, so shall merely mention it.

1. *Extirpation*.—This operation is now undertaken with much more confidence than formerly, and with small danger of a fatal result. Complete extirpation, owing, as I have before remarked, to the occurrence of cachexia strumipriva, has been abandoned. Partial extirpation is performed in cases of exophthalmic goitre and those diffuse forms of thyroid

enlargement where administration of thyroid extract has proved of no benefit. In operating in these cases enucleation should never be attempted, but the superior thyroid artery and veins should first be ligatured, and then the inferior thyroid artery compressed, and the tumour on one side removed without opening its capsule. The inferior thyroid branches should be ligatured quite near the thyroid to avoid injury of the recurrent laryngeal nerve. In vascular cases especially, it is very important first to cut off the blood supply and avoid opening the capsule, for then the thin-walled veins are torn, and furious and uncontrollable hæmorrhage results; the veins are so friable that forceps will not secure them, and it is possible to control the hæmorrhage only by packing. The isthmus should be ligated, if of large size, in sections, with strong catgut or silk. The surgeon of experience will have no great difficulty in performing this operation. A drain should be placed at the lower end of incision for twenty-four hours and then removed entirely.

2. *Enucleation*.—In this country, at any rate, the most frequent form of goitrous tumour is the cystic, solid or fluid. These cysts may be single or multiple, unilateral or bilateral. The unilateral single cysts are the most favourable for operation. Thyroid extract is of no benefit in cystic cases. In these enucleation is the proper mode of treatment. I have now operated on nearly thirty cases by this method, and have not yet had a death, and in all there was a rapid cure.

The operation is undertaken for the relief of dyspnœa, especially on exertion, dysphagia, and to relieve deformity. Nervous symptoms, such as tachycardia, tremor, etc., are frequently noticed in these cases, especially where there has been a sudden increase in the size of the tumour. All my cases have, with one exception, been in women, chiefly for the reason that women submit more readily to operation, and nervous symptoms in them are, perhaps, more pronounced. No doubt—in the province of Quebec at all events—goitre is more common in women than men. In every case in which I have operated, benefit to the general health has resulted,

and the patients looked and felt much better afterwards. The operation is apparently a simple one, but occasionally, when the cyst is adherent, the hæmorrhage is tremendous and most difficult to control; these are cases where external applications have been used, or where there has been at one time an inflammatory condition. This condition is comparatively rare, however. The simplest cases for operation are those where the cyst is single. This cyst may be in either lobe, the isthmus, or in the pyramid or middle lobe. Or the cysts may be multiple and involve all the lobes. The difficulties increase with the increasing number of cysts. When the cysts are on both sides I make two incisions, one over each lobe. The great difficulty of the operation is to know when the proper cyst wall is reached; but after the experience of a few cases, the operator soon gets to know it.

The operation performed by me is as follows* :—The neck having been thoroughly cleansed, an incision some three or four inches long is made directly over the tumour. After cutting through the skin and fascia, the depressor muscles of the thyroid cartilage are reached; but these, if the tumour be large, are so thin as hardly to be noticed. At this point we frequently see a very large anterior jugular vein, which should be divided between two ligatures. As soon as the depressor muscles are cut through, the gland is reached; it looks very much like muscle, and bleeds freely when cut. A small incision should be made through the gland tissue, and at a greater or lesser distance the capsule of the tumour will be seen; it is recognised by its bluish-white colour, but it requires some experience to know when the proper layer is reached. Reverdin says, truly enough, "Whenever you are doubtful, you are not on the growth." When the capsule of the tumour is reached the incision in the gland should be enlarged and the tumour enucleated with the finger. Owing to the hæmorrhage, which so frequently occurs at this stage, it is my custom to puncture the cyst and let out some of its contents; in this way tension is relaxed and the gland comes out of its bed, and as the cyst is delivered it is peeled off from the surrounding gland tissue, any large vessels being

* See article by the writer in *Annals of Surgery*, Sept., 1895.

tied, if torn, then and there. The cyst is delivered like an ovarian tumour. The danger of hæmorrhage is reduced, and the operation is thus made extra-cervical. In this way I have removed very large cysts, which extended below the sternum and covered over the branches of the aorta, without the slightest fear. When the gland is allowed to fall back, and the situation of the cavity from which the cyst has been removed is seen, one is often amazed. In one case I could see all the large vessels pulsating behind the thin wall of the cavity, including innominate artery and transverse innominate vein. In some cases the bed in which the cyst lies is lined with huge tortuous veins, from which the cyst wall had been peeled off.

If there are several cysts, one can be reached through the bed of the other, and no fresh incision need be made in the gland tissue; this saves loss of blood, and lessens the danger of the operation. All bleeding points having been secured, the cavity is packed with iodoform gauze, the end of the strip being allowed to protrude from the lower angle of the wound. I formerly used a drainage-tube, but hæmorrhage is not uncommon when reaction takes place, and I have found that the only cases where this was alarming occurred when a drainage-tube had been used, or the wound closed completely. In no case where gauze was packed in was there any secondary hæmorrhage. The skin wound is sutured with horsehair and a sterilised gauze or cotton-wool dressing applied. At the point where the gauze protrudes a suture of silkworm-gut is introduced and left untied. Next day the wound is dressed, the gauze removed, and the opening closed with the silkworm-gut suture. I never wash out the cavity, or use water at all to wash the wound. A dry dressing is reapplied, and the patients are encouraged to get up and move about. By doing so I think they get better more quickly. The stitches are removed on the fifth or sixth day. Next day patient is discharged. My cases average six days in hospital. The pulse is often rapid, and the temperature may be high after operation; but if the wound looks normal I pay no attention to these symptoms, and they seem to have no injurious effects on convalescence.

They may be due to disturbance of the gland, and perhaps to excess of absorption of thyroid matter during the operation. Large cysts are often more easily removed than small ones, being often less adherent. If the cyst contents be solid I open the cyst and turn as much of the contents out as possible, and then treat the cyst wall as I have described above. In most of the fluid cysts there are usually some solid masses attached to the base. Healing in these cases is marvellously rapid.